Harbor Seal Survey Protocol

Equipment Care and Maintenance:

Optical equipment such as spotting scopes is easily damaged by salt air, wind and dust/sand. Please wipe down equipment with lens cleaner and tissue after each use. There is cleaning equipment available in the equipment boxes. Do not place equipment directly on dirt or sand. Any problems with equipment should be reported to Sarah Codde 415- 464-5210.

Data Management:

In order to closely monitor the progression of pupping through the breeding season, we need to enter data continuously. Therefore, we request that after each field trip you leave the data sheet in the equipment box in a folder marked "DATA". Please write clearly!!!

Schedule:

Sarah Codde is the main contact for scheduling. A copy of the calendar will be posted on the Internet at https://www.google.com/calendar/embed?src=1odjecjhq94tp6rlfqmh5p369o%40group.calendar.google.com&ctz=America/Los_Angeles
and updated every other day. We request that you sign up for a minimum of 2 surveys per month. The survey period extends from March 1 through the end of July. If you cannot make a survey, please contact Sarah Codde ASAP so that we can find another person to do the survey.

If you cannot survey your scheduled day, please contact us at least 2 days before your survey date.
Sarah Codde: 415-464-5210 or Sarah Allen: 415-623-2202

Tides:

To maximize the number of seals on the haul out sites, surveys should be conducted between a medium (2.5 ft) and a low (-1.0 ft) tide level during mid-day. Some weeks, though, that is not possible, so you should schedule your survey to coincide as closely as possible with the lowest tide of the day. For example, if low tide of –1.0 is at 7 am then survey between 8-11 am. The maximum tide with which you are able to survey is 3.0 ft. Surveys should not start earlier than 8 am and should end no later than 7 pm.

Each location has an adjusted tide level to the tide at the Golden Gate Bridge. Below are the low tide adjustments. Please check to make sure your tide schedule is for the Golden Gate Bridge.

Site	Correction (minutes) for the GG Bridge
Tomales Bay	+30
Tomales Point	-30
Point Reyes Headlands	-25
Drakes Estero	+45
Double Point	-30
Bolinas Lagoon	+37
Duxbury Reef	-25
Point Bonita	-10

Internet resources for tide schedules are located in the "Useful Websites" section of this manual.

Survey Instructions:

1. **Check Tides** and create your schedule taking travel and hiking time into consideration.

2. **Pack equipment**:

Binoculars	Lunch	Hat
Pen/Pencil	Snacks	Layers of clothing
Hiking boots	Water	Insect Repellant (for ticks)
Rain gear	Cell Phone	

3. **Go to Equipment Box** and get survey equipement.
   Equipment boxes are located at Bear Valley Headquarters and Point Reyes Bird Observatory (code for lock is 1579), or Point Bonita (lockbox code is PHV)

Scope	Data sheets
Tripod	Clipboard
Counter	Binoculars

   Radio (for DE, DP, TB, and TP sites)

4. **Drive and hike out to your site**.
   See "Site Specific Instructions"
   Collect the data and record any potential or actual disturbances to the harbor seals.
   ****On weekends call Dispatch (415-464-5170) and on weekdays call Sarah Codde (415-464-5210) to let them know you are going out to do a survey. Make sure that you call when you are finished so they know that you are back and do not need help.** For additional safety please let a friend or neighbor know where you are going.
   ****If you are surveying DE, DP, TB, or TP, bring the park radio with you and keep it turned on.** The radio should be used for emergencies.

5. **Clean and return any equipment** you borrowed to the equipment box, leave your data sheets in the equipment box as well.

Site Specific Instructions:

Double Point, Drakes Estero, Tomales Bay, Point Bonita:
Stay at the observation site for a total of two hours. Survey all of the subsites, 4 times, once every ½ hour. If the number of seals is too large to be able to count in a half hour, then survey all of the subsites twice, once per hour.

Bolinas Lagoon and Duxbury:
Because the low tide at Duxbury is –25min, and the low tide at Bolinas is +37min. it is a good idea to survey Duxbury first. Each of the subsites should be surveyed a minimum of two times. Survey at Duxbury, wait a ½ hr. survey Duxbury again. Go to the Hwy1 observation site to count HWY1 and PWI subsites and then go to the Sea Drift observation site to count the KI subsite. Stay at Sea Drift for a ½ hr, survey again, and then finish at the Hwy1 observation site. You must wear the high visibility safety vest at the Bolinas Lagoon subsites.

Tomales Point:
Each subsite will be surveyed twice, instead of four times because of the distance between subsites. Survey Two Rock Beach, Rope Beach, and then Bird Rock. Stay at Bird Rock for a ½ hr and then survey Bird Rock again. Then survey Rope Beach and Two Rock Beach again on your way back.

Identifying A Disturbance

A **disturbance** is any event which potentially could, or does disturb the seals. Tracking disturbances allows us to monitor the amount of activity, especially human activity, in an area. By recording the seal's reactions to these events we will also be able to observe trends or changes in their reactions. An example of a trend is continual flushing, which may lead to the desertion of a site.

Disturbance Source Type Definitions and Categories:

→ Aircraft: *Airplane, helicopter, hang glider* below 1000 ft, flying over water or survey location, including ultra lights.

→ Bird: birds (especially *vulture, gull, or raven*) that may be associated with a Flush or Flush Water. Examples: gull pecking at a seal.

→ Human:
- *Clammer:* clam digging within the haul-out location.
- *Fisherperson:* any person fishing in or around the haul-out location.
- *Researcher:* when seals respond to your presence. For example, if the seals HA when you arrive at the survey location.
- *Hiker, surfer, horse rider, etc…:* any person within 300 ft of haul out zone.

→ Dog: any dog seen or heard barking. Note if dog is *on or off leash*.

→ Motor boat: *Motorboat and jet skis*, within 500 ft of haul out zone.

→ Non-motor boat: *Canoe, kayak, sailboat, wind surfer*, within 300 ft of haul out zone.

→ Vehicle: *Car, bus, motorcycle*, only if it is unusually loud, for example, beeps its horn or backfires.

→ Other: *Coyote, other pinniped, rock slide, any activity that causes change in seal behavior*. Please describe in comments.

→ Unknown: when seals are disturbed but there is no observable source.

Harbor Seal Behavior Definitions:
- No Response (NR): when a Disturbance Type is observed and recorded but none of the seals exhibit any of the behaviors below.
- Head-Alert (HA): when a resting seal raises its head and clearly looks around. The seal's eyes are open, and the seal is not scratching itself. If a seal looks at another seal, the head raise should be counted. If a seal continuously keeps its eyes open and head raised then count this as one Head-Alert. Note Head-Alerts only if $\geq$ 5 seals exhibit this behavior.
- Flush (F): seal movement towards the water but not completely in the water. Rising tides do not constitute approaching the water.
- Flush Water (FW): when, in one continuous movement, $\geq$ 5 seals approach the water and within 10 seconds are completely wet by the water.

Equipment Boxes:

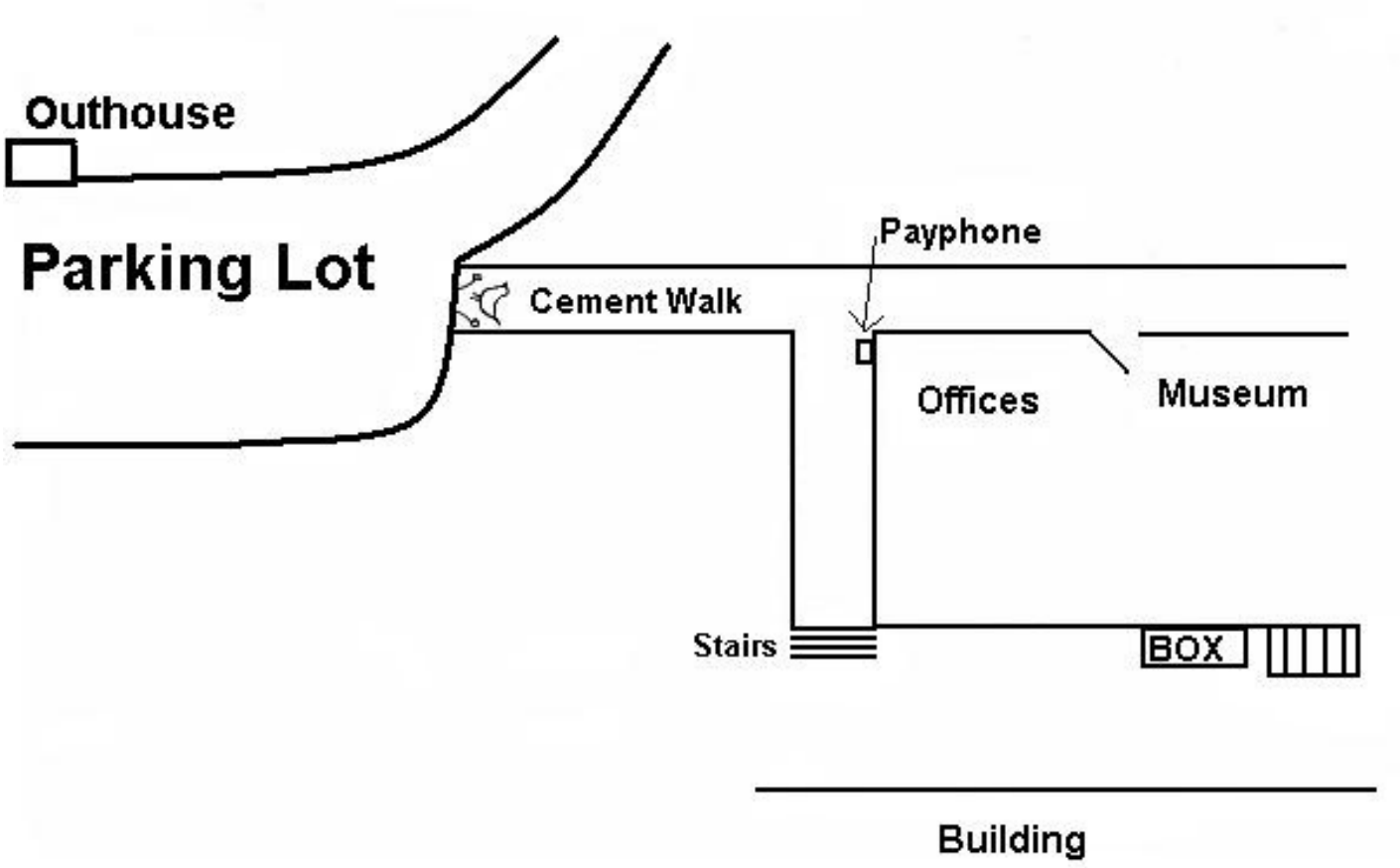
Bear Valley Equipment Box:
After turning off of Bear Valley Rd., instead of heading towards the visitor center, turn right into the administrative building parking lot. Go past the first parking lot, across the small bridge and go to the next white building on your right. The box is located on the smaller back porch of this building.

Use For: Tomales Bay, Tomales Point, Drakes Estero

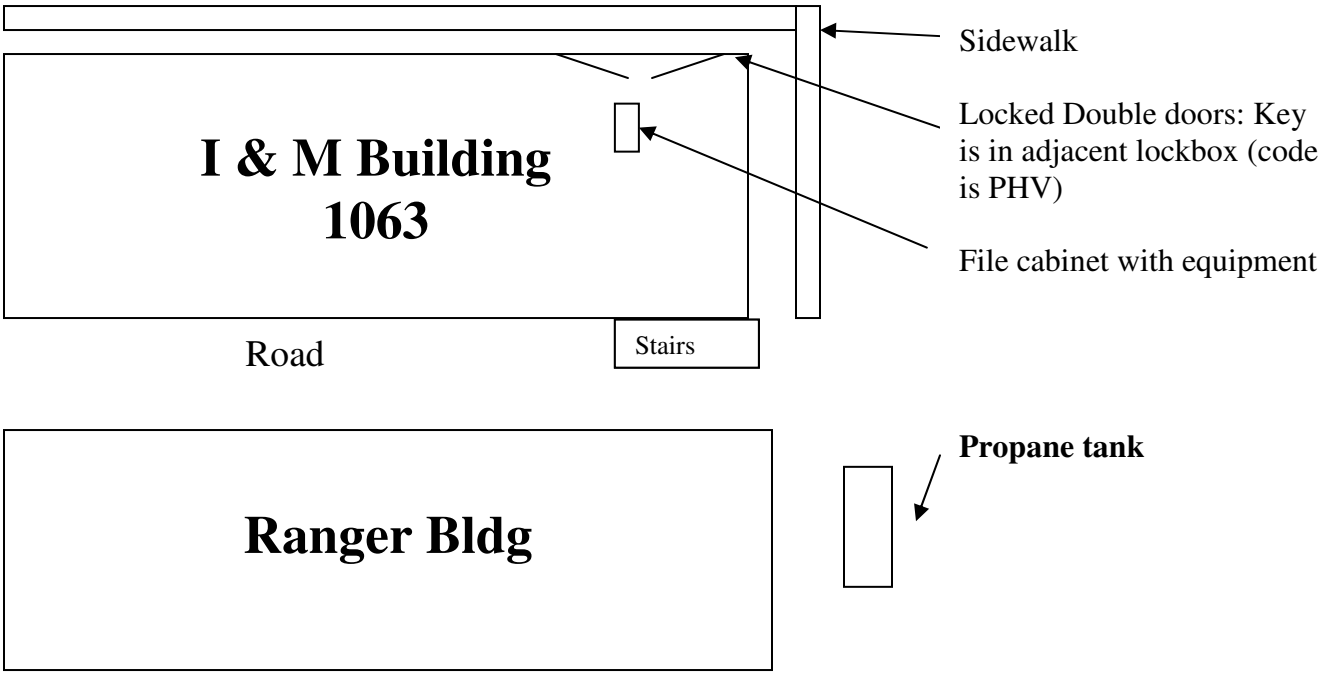
Point Reyes Bird Observatory Equipment Box:
Start at the intersection of Sir Francis Drake Blvd, and Rt. 1, in Olema. Go 9.6 miles south on Rt.1, and then turn right onto Horseshoe Hill Rd. After approximately 3 or 4 miles, and at your second stop sign, take a right onto Mesa Rd. About a ½ mile after the road turns to gravel, turn into the Point Reyes Bird Observatory on your left. Drive into their parking lot. Take the cement walkway with the bird engraved into it. There is a pay phone straight in front of you. Turn right at the pay phone and continue down the stairs. Turn left at the bottom of the stairs. The wooden equipment box is against the back of the building.

Use For: Double Point, Bolinas Lagoon, Duxbury Reef

Combination for Lock: 1579
The combination for both boxes is 1579, the year that Sir Francis Drake landed at Point Reyes.



Point Bonita Equipment Box and Directions:



This direction from the map is Rodeo Beach. These buildings are part of several cream colored bldgs with red roofs that make up Ft. Cronkhite. This is also near where the Marine Mammal Center is located. In order to get to Ft. Cronkhite follow the signs in the headlands to "the beach".

Directions for Radio Use

Take both the radio and the extra battery along with you when you survey. Keep the radio on so that you can hear if someone is trying to reach you.

There are only three controls you have to operate:

The **On/Off/Volume** rises up from the top of the radio on the left side.
The **Channel Selector** is larger and rises up from the top in the middle.
The **Talk Button** is the largest button on the left side.

The LCD screen displays which channel you are on. You will use one of the following channels depending on where you are:

Barnaby - east of Inverness Ridge
Point Reyes Hill - the Central area
Lighthouse - west of Inverness Ridge and along the coast.

When you press the **Talk Button**, the top left of the LCD screen will indicate whether there is a strong signal. If the channel you are on doesn't work, rotate the Channel Selector to another channel.

Each channel has a digital and analog option indicated by either the letter "D" or "A" on the LCD screen next to the name of the channel. The digital option is recommended, but if you don't get a signal on D, rotate the Channel Selector to A

To operate, place your mouth about 6 inches from the radio, press the **Talk Button**, wait two seconds and then say either "**799… harbor seal volunteer (*and your last name)***" or "**Any available ranger… harbor seal volunteer (*and your last name)***". 799 is the radio call number for dispatch.

Listen to make sure no one is on the radio before you use it. Think about what you are going to say before speaking. Talk normally but briefly. Be professional – remember others are listening. When you're done, stop talking - **Don't** say "over" or "roger". You **do not** need to say what channel you are on.

If we have an incident Dispatch may put a "Code 33" on the radio.
If you hear a tone (loud long beep) and they call for a "Code 33", **STAY OFF** the radio, unless you have priority traffic or you're involved in the incident.


Channel Selector
On/Off/Volume
Push-to-talk
Signal bars
Battery Level
ICOM

Site Directions / Haul-out Site Descriptions

NOTE: These site descriptions cannot substitute for visiting the site during training.

Bolinas Lagoon
Subsites: HWY1, Kent Island (KI), Pickle Weed Island (PWI).
Hiking: No

From San Francisco, take 101N, exit at Mill Valley/Stinson Beach/Hwy1. Follow signs for Stinson Beach via Hwy1/Shoreline Hwy. Pass through Stinson Beach on Hwy1. Calle Del Arroyo Rd. will be on your left, 1.6 miles further north, park on the right hand side of the road in a small dirt parking lot to survey for HWY1 and PWI sites (see below).

From Bear Valley, start from the intersection of Sir Francis Drake Blvd, and Rt. 1, in Olema. Traveling south on Hwy1, the Hwy1 site is 12 miles from this intersection. It is 1.3 mi. past the sign for the Audubon Canyon Ranch. There will be a small dirt parking lot on your left. At the back of the lot is a brown sign that says no camping/overnight parking. Park your car here. The best vantage spot is approximately 100 yards north on Rt. 1 (in the direction that you came from). Here you are at least a little bit above the seals, and it is easier to count them. There is very little room on the side of the road, however, so please watch out for cars! The group of seals right in front of you is the Hwy1 subsite. The group of seals off to the left is PWI.

1.6 miles further south down Rt.1, turn right onto Calle Del Arroyo Rd., at the end of the road you will come to a guard shack for Sea Drift, a gated community. Tell them you are with Point Reyes and are here to survey the harbor seals. Immediately after the guard shack, turn right onto Dipsea Rd. Across from house #197, right before the grey/blue boathouse, there is a small pullout. Park your car here. At low tide, a sandbar will be visible from here (KI). Kent Island is the sandbar across the channel.
Sea Drift gate hours: M – Th 7 AM – 1:30 PM, 3 PM – 6 PM
Friday 7 AM – 9 PM
Sat & Sun 9:30 AM - ?
If no one is at the gate, back up, park, and go across the road to the Assoc. office and they will open the gate for you. There might not be anyone there before 9:30 on the weekends.

For this site, you must wear the high visibility safety vest while surveying on the side of the road. This vest can be found in the equipment boxes at Bear Valley and Point Reyes Bird Observatory.

Duxbury Reef
Subsites: None
Hiking: No

From San Francisco, take 101N, exit at Mill Valley/Stinson Beach/Hwy1. Follow signs for Stinson Beach via Hwy1/Shoreline Hwy. Pass through Stinson Beach on Hwy1. Go about 3 miles, take a left onto Olema/Bolinas Rd. (this road is not labeled), right at the end of the bay. At the end of this road, take a left onto Horseshoe Hill Rd, then follow the directions below.

From Bear Valley, start at the intersection of Sir Francis Drake Blvd, and Rt. 1, in Olema.
Go 9.6 miles south on Rt.1, and then turn right onto Horseshoe Hill Rd.
After approximately 3 or 4 miles, at your second stop sign, take a right onto Mesa Rd for 0.6mi.
Take a left onto Overlook Dr for 0.5mi.
Take a right onto Elm Rd for 0.6mi.
Take a left onto Maple Ave (across from Bolinas Community Center) – *Continued on next page*

Drive to the end of the road and park in the small dirt parking lot.
Set up at the bench. The reef is right across the way. The seals tend to haul out at the end beyond where the tidepoolers can get to, but make sure to check the entire length.

Double Point
Subsites: North Beach (NB), North Beach Rocks (NBR), and Stormy Stack (SS), South Beach (SB), Tide Pools (TP) and South Point (SP).
Hiking: 8 miles round trip, on and off trail

Start at the intersection of Sir Francis Drake Blvd, and Rt. 1, in Olema.
Go 9.6 miles south on Rt.1, and then turn right onto Horseshoe Hill Rd.
After approximately 3 or 4 miles, at your second stop sign, take a right onto Mesa Rd.
You will pass the Point Reyes Bird Observatory on your left. Stop and get equipment if you need to.
Continue down the dirt road (Mesa Rd.) to the end and park in the Palomarin parking lot.
Take the Coast Trail. ¼ mile down the trail there is a turnoff on your left that leads to the beach. Do NOT take this turnoff, continue straight.
After a steep hill, and a slight downhill, you will come to a fork.
Take the left-hand fork to stay on the Coast Trail.
Pass several ponds and Bass Lake, which is about 2.6 mi. or 3.1 (info varies on mileage) from the start of the Coast Trail.
About a ½ mile after Bass Lake, on the right side of the trail is a small sign for Crystal Lake, and a separate trail closed sign, with a minor trail next to the sign. This trail is right before the main trail starts to descend. Backtrack a few yards and on the left side of the trail is a "trail -opening in the trees." This is the off-trail route to DP. Make sure you are heading towards the ocean. This off-trail route is only for harbor seal volunteers, not the public, so there are no signs for this trail. Once on it, follow what appears to be a "trail" of sorts. Continue through the coyote brush, which will become thick and prevalent near the end. This part will be marked with flagging tape. You should see a pond to your right (Pelican Lake). Continue until you come to top of the cliffs and can look down onto DP beach and sea stacks. This off-trail section takes 25-30min.

Drakes Estero:
Subsites: Drakes Beach (DB), Drake's Mouth Sandbars (DEM), Limantour Spit (L), Main Colony (A), Sandbar to the Right of A (A1), Upper Estero Near (UEN), Oyster Bar (OB), Upper Estero Far (UEF).
Hiking: 45min one way.

Park at Drakes Beach at the Ken Patrick Visitor Center. Walk down the beach to the left. The beach is bordered to your left by steep cliffs. Watch out for rock debris. Soon after you climb over a rock formation, the cliff ends temporarily. This is where Horseshoe Pond exchanges water with the ocean. Walk across the beach to the end of the pond, and head up the hill using an old abandoned ranch road. Continue on the road until it begins to slope down the other side of the hill. You will see some cypress tress with a rookery below you. Don't go towards the trees, but leave the road and hike up the hill, away from the ocean and towards the Estero and find a spot with good visibility.

If the tide is too high to walk the beach, at the visitor center go left but instead of walking on the beach, climb the bluff and walk parallel to the beach. Please beware of erosion issues and do not hike near the cliff edge. You will descend just before Horseshoe Pond. Cross the beach and follow the directions above. Alternatively, you can park at the abandoned D Ranch, the last ranch on your left before Drakes Beach, and hike across the field and down to Horseshoe Pond. It is about equivalent distance to the suggested route above. If you do park at D Ranch, you much notify dispatch and leave a note in the windshield explaining you are a harbor seal volunteer.

Tomales Point:
Subsites: Two Rock Beach (TRB), Rope Beach (RB), Bird Rock (BR)
Hiking: 9 mi and continuous throughout survey

Follow Sir Francis Drake towards the lighthouse. Turn right onto Pierce Point Rd. towards Tomales Bay State Park. Follow the road into the Tule Elk reserve and park at the Upper Pierce Ranch parking lot and take the Tomales Point Trail.

Two Rock Beach
Two Rock Beach is the first subsite you will survey. You will begin to hike up a large hill about 15-20 minutes into the hike. About three-quarters the way up the hill, you will pass a fenced enclosure on your right. About 2-3 minutes past this enclosure you will pass the first rock outcroppings. At this point the path is still uphill. 8-10 minutes after passing the enclosure you will reach the crest of the hill. About 2 minutes after you have passed the crest of the hill you will arrive at a large rock outcropping, located about twenty feet from the left side of the trail. This rock out cropping is an important landmark. Forty feet past the rock outcropping is a water bar on the right that points towards Tomales Bay.

Stand on the trail facing the pile of rocks and pretend that the pile of rocks is at 12 o'clock. Then hold your right arm out so that it is pointing towards an imaginary 2 o'clock. Walk in this direction. You will cross a long gully. Keep going towards the coast until you reach the observation point. From the observation point look back south towards the lighthouse or McClures Beach, you should be able to see the beach as well as a variety of flat rocks along the shore. It is on these flat rocks where the harbor seals usually haul out. Two Rock Beach is so named because each side of the beach has two large rocks, approximately 100m from shore. Make a count and then return to Tomales Point trail.

The alternative way to get to the observation site for TRB is to walk past the main rock outcropping landmark for a few minutes until you see "Split Rock". This is a small boulder about 100 ft from the left side of the trail that looks like one rock as you are approaching it and then when you are directly across from it you will see it is two rocks. Stand in front of "Split Rock" and pretend it is at 12 o'clock. Then hold up your right arm out so it is pointing towards an imaginary 1 o'clock, walk in this direction until you reach the observation point.

Rope Beach
After returning to the Tomales Point trail, continue north. You will go down a long gradual hill. Near the bottom of the hill, on your right will be a pond and ahead will be a line of tall trees. This is Lower Pierce Point ranch. Go around the west side, or ocean side, of the trees and head for the coast. Walk north along the coast counting as you go. Continue to walk north along the coast until Bird Rock is easy to survey. Seals can be hauled out on any of the many rocks and beaches along this segment of the coast, so remember to look down over the cliffs often to makes sure you are not missing any of them. During breeding season you will need to hike until you are directly across from Bird Rock, then look back at the beach across from Bird Rock, in order to see all of the seals.

Bird Rock
Bird Rock is north of Rope Beach. Bird Rock is a large white rock about 400 yards from shore, where shorebirds nest and seals haul out. Hike north until you are confident in your ability to count the seals on Bird Rock. Count here twice, then survey RB and TRB on your way back.

Tomales Bay:
Subsites: Seal Island (SI), Clam Island (CI) Hog Island (HI).
Hiking: 5 mi round trip

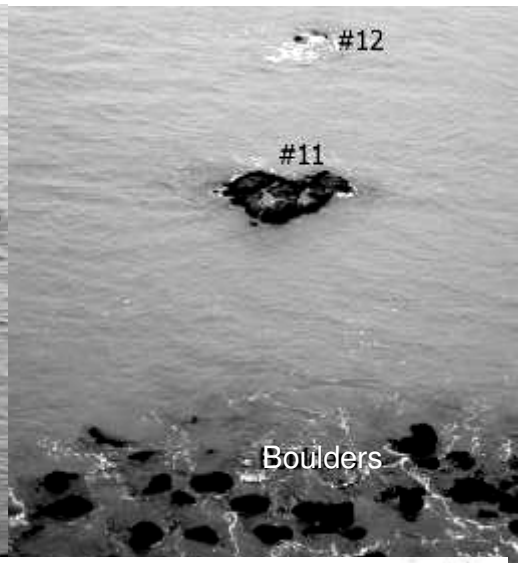
Follow Sir Francis Drake towards the lighthouse. Turn right onto Pierce Point Rd. towards Tomales Bay State Park. Follow the road into the Tule Elk reserve and park at the Upper Pierce Ranch parking lot and take the Tomales Point Trail.

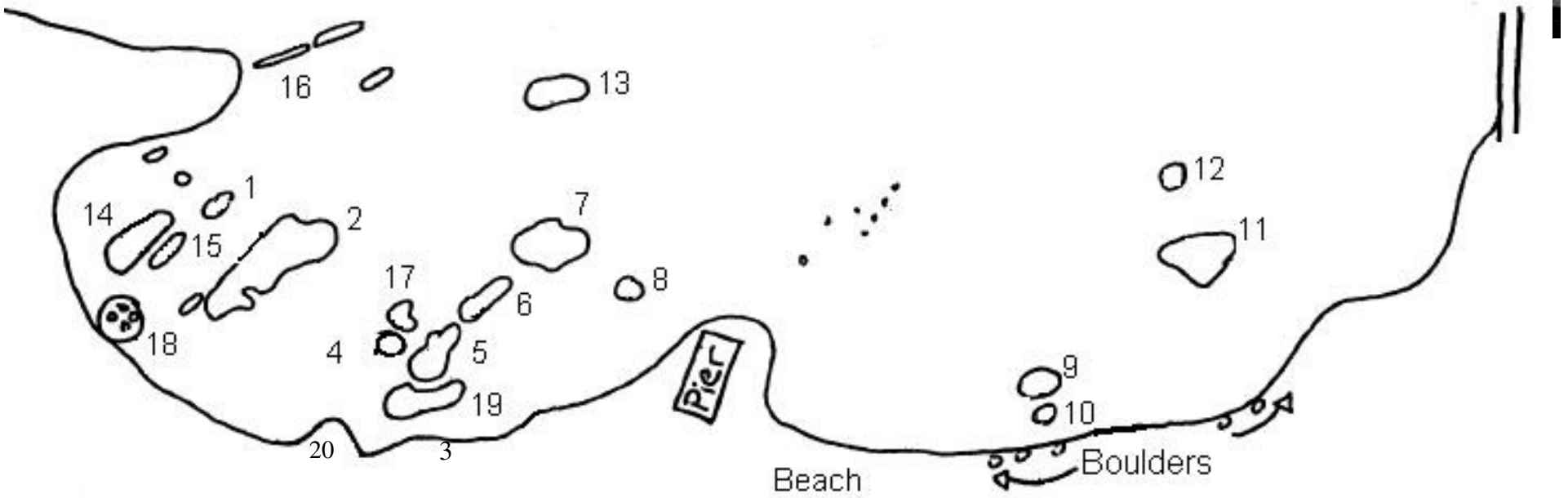
You will begin to hike up a large hill about 15-20 minutes into the hike. About three-quarters the way up the hill, you will pass a fenced enclosure on your right. About 2-3 minutes past this enclosure you will pass the first rock outcroppings. At this point the path is still uphill. 8-10 minutes after passing the enclosure you will reach the crest of the hill. About 2-minutes after you have passed the crest of the hill you will arrive at a large rock outcropping, located about twenty feet from the left side of the trail. This rock outcropping is an important landmark. Continue walking 50-100 yards past the rock outcropping then turn right and cut across the field towards the bay. Hike down towards the bay until you have a good view of the sandbars down below in the bay. It may take some experimentation to find the best spot to count from. Seal Island and Clam Island, which are both sandbars, should be in front of you while Hog Island will be way off to the right. Seal Island is the sandbar closer to you, while Clam Island is the sandbar further away from you.

Point Bonita:
Subsites: # 1-20
Hiking: No

From Hwy 101 take the Alexander Avenue/Marin County exit. Turn right at the stop sign on to Alexander Avenue. After approximately 100-200 yards, turn left towards the tunnel on Bunker Road (look for Marin Headlands Visitor Center sign). You will drive through a one-way traffic tunnel. There may be up to a five minute wait to enter the tunnel. Continue on Bunker Road to its intersection with Field Road. Turn left onto Field Road. You will pass the Headlands Visitor Center and the historic Nike Missile Site. Follow signs to the Point Bonita Lighthouse. This site involves a very short walk and looks down upon a group of rocks on which the harbor seals haul out. This site is maintained by Golden Gate National Recreation Area. Let the volunteer coordinator know if you are interested in learning how to survey this site.

Point Bonita





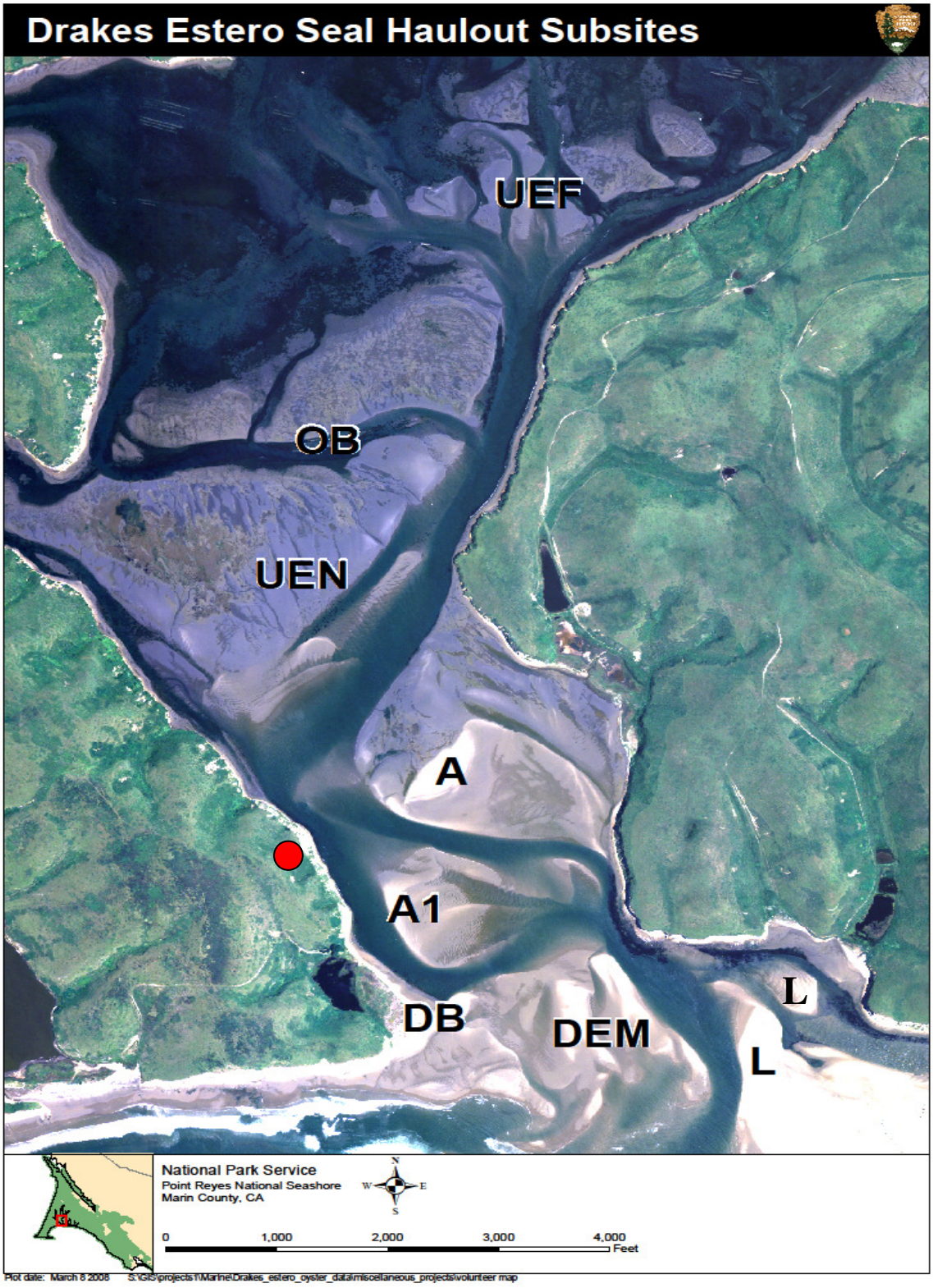
BOLINAS LAGOON

● Observation Points

HWY1 Highway 1 sand bars

PWI Pickle Weed Island

KI Kent Island



Observation Site

A1	Main haul-out	**L**	Limantour Spit
A	Next to Main haul-out	**UEN**	Upper Estero Near
DB	Sandbar attached to land	**OB**	Oyster Bar
DEM	Drakes Estero Mouth Sandbars	**UEF**	Upper Estero Far

Double Point

● Observation Point

SS	Stormy Stack	**SB**	South Beach
NBR	North Beach Rocks	**TP**	Tide Pools
NB	North Beach	**SP**	South Point

DUXBURY REEF

Tomales Bay

●	Observation Point	**SI**	Seal Island
CI	Clam Island	**HI**	Hog Island

Tomales Point

Observation Site

Observation Area

TRB Two Rocks Beach

RB Rope Beach

BR Bird Rock

Created By: Kristen Truchinski
2/14/07

GGNRA POINT BONITA HARBOR SEAL SURVEY

Date:_____ **Day of Week**_____**Year**_____ **Location:**_____

Start Time:_____**End Time**_____**Observers:**_____

Weather: Visibility (1=clear, 2=slightly obscured, or 3=very poor) _____ Rain (Y/N)____ Low Tide Level closest to survey time _____

# of White Pelicans:_____ # of Brown Pelicans:_____ All subsites surveyed? (Y or N) _____

Time Survey every ½ hr	Sub-Site	No. Adults & Imm	No. Live/ Dead Pups	Subsite Total	No. Dead Pups	No. Red Seals	No. Shark Bite	Seals Disturb Y/N	Survey Total All subsites Each ½ hour	Comments

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date:_____ Day of Week_____Year_____ Location:_____

Start Time:_____End Time_____Observers:_____

Weather: Visibility (1,2 or 3)_____ Rain (Y/N)____ Low Tide Level closest to survey time _____

# of White Pelicans:_____ # of Brown Pelicans:_____ All subsites surveyed? (Y or N) _____

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES:** **Drakes Estero** (**A=**A sandbar, **A1=**A1 sandbar, **DEM=**Drakes Estero Mouth, **OB=**Oyster Bar, **UEF=**Up Estero Far, **UEN=**Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack)
Tomales Point (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island)
Bolinas Lagoon (**KI**=Kent Island, **PWI=**Pickleweed Island, **HWY1=** Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

Revised March 2009

FOR OFFICE USE ONLY: Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date:_____Year_____ Location:_____Observers:_____

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	Total No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)

***SOURCE: Use a specific source listed on the back of this sheet**

****SUBSITES: Drakes Estero** (**A=**A sandbar, **A1=**A1 sandbar, **DEM=**Drakes Estero Mouth, **OB=**Oyster Bar, **UEF=**Up Estero Far, **UEN=**Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack)
Tomales Point (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island)
Bolinas Lagoon (**KI**=Kent Island, **PWI=**Pickleweed Island, **HWY1**= Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

*****SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)**

Revised February 2013

FOR OFFICE USE ONLY: Entered Checked

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

Created March 2009

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 4/17 **Day of Week** Sun **Year** 2005 **Location:** Tomales Bay

Start Time: 12:30 **End Time** 14:30 **Observers:** Melanie Vanderhoof

Weather: **Visibility (1,2 or 3)** 1 **Rain (Y/N)** N **Low Tide Level closest to survey time** 13:10 @ 0.4

# of White Pelicans: 0 **# of Brown Pelicans:** 0 **All subsites surveyed? (Y or N)** Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
12:30	SI	152	27	179	0	8	0	Y		Very windy, hard to
	CI	265	15	280	1	5	1	Y	459	get an accurate pup
	HI	0	0	0	0					count
13:00	SI	165	27	192	0	8	0	N		
	CI	274	18	292	1	4	1	N	484	
13:30	SI	164	26	190	0	7	0	N		
	CI	280	18	298	1	4	1	Y	488	See disturbance sheet
14:00	SI	161	26	187	0	7	0	Y		
	CI	276	17	293	1	6	0	N	480	

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES:** **Drakes Estero** (**A=**A sandbar, **A1=**A1 sandbar, **DEM=**Drakes Estero Mouth, **OB=**Oyster Bar, **UEF=**Up Estero Far, **UEN=**Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, **PWI=**Pickleweed Island, **HWY1**= Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/17 **Year** 2005 **Location:** Tomales Bay **Observers:** Melanie Vanderhoof

Time	Source *	Number of Source	Sub-Site	Seal Behavior **	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:40	Birds -gulls	~20	SI	HA	179	152	27	0	N/A	Flock of birds
										Flew overhead,
										15 HA
12:50	Kayak	2	CI	FW	280	221	15	44	Y, 13 in	
									10 min.	
13:35	Motor Boat	1	CI	NR						Blue and white
										Fishing boat within
										200 ft
14:10	Plane	1	SI	F	187	161	26	0	N/A	Low flying, ultra
										Light plane,
										45 flushed

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SOURCE: Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other**

****SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)**

Environmental Factors

Tides
Equilibrium tidal theory describes tides as the balance between gravitational and centrifugal forces. A semi-diurnal tide is an equatorial tide wave with two troughs and two crests, thus the two high and low tides. Neap tides have the least tidal range and occur during the moon's first and last quarters, when the moon and sun are perpendicular to the earth (Figure 1). Spring tides have the greatest tidal range and occur when there is a new or full moon (when the moon is in line with the sun and the earth).

The position of the earth, moon and sun are the primary factors that determine the tides. To better understand the gravitational and centrifugal forces on the tides, picture the following: imagine a ball covered evenly with metal chips, which symbolize the water. Moving around the ball is a magnet. Chips are pulled towards the magnet so that the ball has a bulge of chips on one side and only a few chips on the other side. As the magnet moves, the bulge also moves. This magnet is like the moon and its effect on the ocean. As the moon moves around the earth it creates a bulge in the ocean. The movement of this bulge is analogous to the movement of the tides. The sun also has a gravitational pull on the oceans but less than the moon, because it is farther from the earth. Therefore, when the moon and sun are in line with the bulge on the earth's side, the pull is the greatest and spring tides occur.

For more info check out NOAA's web site at http://www.co-ops.nos.noaa.gov/restles1.html .
For local tide tables go to NOAA's Tides Online at http://www.tidesonline.nos.noaa.gov/ .

Oceanic Productivity
Much of the productivity off of the California Coast and within the Gulf of the Farallones National Marine Sanctuary is due to coastal upwelling and the San Francisco Bay plume. In the spring and fall, downshore winds blow from the northwest along the coast heading south. As these winds blow, they cause the movement of the surface water. As this movement is translated down through the water column and influenced by the Coriolis effect (a physical phenomenon, produced by the spinning of the Earth on its axis, that causes objects to veer to the right in the waters offshore (Figure 2). As the warm surface water moves out, it is replaced by cold, deep water rich in nutrients. This input of nutrient-rich water to the surface, coupled with increased sunlight in the upper part of the water column, leads to high productivity of plankton and then fish, birds and mammals.

El Niño
Overview:
The term "El Niño" refers to a different but still recurrent set of climatic and oceanic conditions in which a warm ocean current moves north as a result of shifting wind patterns. This even recurs at irregular intervals ranging from two years to more than a decade apart. "Southern Oscillations" refers to the combining effect of barometric pressure rising in the east as it falls in the west. This pressure seesaw is part and parcel of the same phenomenon. When the northeastern Pacific (the west coast of North America) experiences an El Niño-Southern Oscillation, upwelling and productivity are diminished. This affects the entire marine food web within the area, as well as the fishing industry and survivability of fish, birds and mammals.

Implications for Weather:
Consequences are increased rainfall across the southern tier of the US and in Peru, which has caused destructive flooding, and drought in the West Pacific, sometimes associated with devastating brush fires in Australia. Observations of conditions in the tropical Pacific are considered essential for the prediction of short-term (a few months to 1 year) climate variations. To provide necessary data, NOAA operates a

network of buoys, which measure temperature, currents and winds in the equatorial band. These buoys daily transmit data, which are available to researchers and forecasters around the world in real time.

Non-El Niño Conditions:
In normal, non-El Niño conditions, the trade winds blow towards the west across the tropical Pacific. These winds pile up warm surface water in the west Pacific, so that the sea surface is about 1/2 meter higher at Indonesia than at Ecuador. The sea surface temperature is about 8 degrees C higher in the west, with cool temperatures off South and North America, due to an upwelling of cold water from deeper levels. This cold water is nutrient-rich, supporting high levels of primary productivity, diverse marine ecosystems, and major fisheries. Rainfall is found in rising air over the warmest water, and the east Pacific is relatively dry. The observations at 110 W show that the cool water (below about 17 degrees C) is within 50m of the surface.

El Niño Conditions:
During El Niño, the trade winds relax in the central and western Pacific leading to a depression of the thermocline in the eastern Pacific, and an elevation of the thermocline in the west. The observations at 110W show, for example, that during 1982-1983, the 17-degree isotherm dropped to about 150m depth. This reduced the efficiency of upwelling to cool the surface and cut off the supply of nutrient rich thermocline water to the euphotic zone. The result was a rise in sea surface temperature and a drastic decline in primary productivity, the latter of which adversely affected higher trophic levels of the food chain, including commercial fisheries in this region. The weakening of easterly tradewinds during El Niño is evident in this figure as well. Rainfall follows the warm water eastward, with associated flooding in Peru and drought in Indonesia and Australia. The eastward displacement of the atmospheric heat source overlaying the warmest water results in large changes in the global atmospheric circulation, which in turn force changes in weather in regions far removed from the tropical Pacific.

(Taken from NOAA web site: http://www.pmel.noaa.gov/tao/elnino/el-nino-story.html)

Useful Websites:

Online Harbor Seal Monitoring Program Calendar:
https://www.google.com/calendar/embed?src=1odjecjhq94tp6rlfqmh5p369o%40group.calendar.google.com&ctz=America/Los_Angeles

Harbor Seal Monitoring Volunteer Webpage:
http://www.nps.gov/pore/supportyourpark/volunteer_docents_harborseal.htm

Tide Schedules:
http://www.tidesonline.nos.noaa.gov/
http://tidesandcurrents.noaa.gov/get_predictions.shtml?year=2010&stn=1813+San+Francisco
http://www.saltwatertides.com/dynamic.dir/californiasites.html#bolinas
http://tbone.biol.sc.edu/tide/tideshow.cgi?site=Point+Reyes%2C+California&units=f

Weather:
http://newweb.wrh.noaa.gov/mtr/forecast.php
http://www.wrcc.dri.edu/weather/prca.html (Ndoc)
http://www.wrcc.dri.edu/weather/prey.html (Lighthouse)

Swell Information:

http://www.lajollasurf.org Click "Weather" on top, then "Buoys" on the left, then click the "Northern California" picture, then click the "Point Reyes" dot on the map

Marine Mammals:
http://www.tmmc.org/
http://npca.org/marine_and_coastal/marine_wildlife/
http://nmml.afsc.noaa.gov/
http://userwww.sfsu.edu/~halmark/seals.htm
http://www.nps.gov/pore/science_current_resmgt_nes.htm Elephant Seal Monitoring
http://www.sealwatch.org
http://www.nmfs.noaa.gov/pr/sars/

Stranded/Dead Seals:
http://www.nmfs.noaa.gov/pr/health/networks.htm
http://www.tmmc.org/what_we_do/rescue/whattodo.asp

Contact Information:

Harbor Seal Coordinator
Sarah Codde 415-464-5210

Harbor Seal Program Advisor
Sarah Allen 415-623-2202

Law Enforcement
Chief Ranger: David Schifsky 415-464-5175

Dispatch 415-464-5170
Golden Gate National Recreation Area Dispatch (Pt Bonita) 415-561-5505

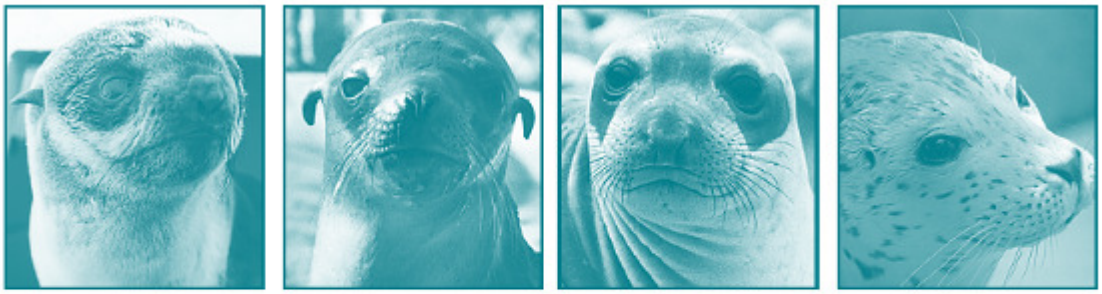
Marine Mammal Center

The Marine Mammal Center (TMMC) is focused on rescuing, rehabilitating and releasing marine mammals as well as educating the community and conducting research on marine mammals.

When the Marine Mammal Protection Act was first passed in 1972, it mandated the creation of a stranding network of which the MMC is a member. Some marine mammals strand because of harassment or injuries caused by humans, such as entanglement in fishing gear or marine debris, ingestion of plastics, gunshot wounds, or boat strikes. In 2002, over 700 animals were treated at their hospital.

For more information visit their web site at http://www.tmmc.org/ .

If you see a wild marine mammal that may be in distress, call 415.289.7325



NORTHERN FUR SEAL CALIFORNIA SEA LION NORTHERN ELEPHANT SEAL PACIFIC HARBOR SEAL

The Marine Mammal Center
Advancing Rehabilitation, Scientific Discovery and Education

You can also help by becoming a member or volunteering. Call us at 415.289.SEAL or visit our website at www.tmmc.org

Marin Headlands • 1065 Fort Cronkhite • Sausalito, CA 94965

[redacted]

1 Do not touch, pick up or feed the animal. Do not return the animal to the water.
Seals and sea lions temporarily "haul out" on land to rest and mothers briefly leave their pups while at sea. A beached whale or dolphin should be reported immediately.
2 Observe the animal from a distance of at least 50 feet. Keep people and dogs away.
3 Note physical characteristics such as size, presence of external ears and fur color. This helps us determine the species and what rescue equipment and volunteers are needed.
4 Note the animal's condition. Is it weak and gaunt? Any open wounds?
5 Does it have any obvious identification tags or markings?
6 Determine the exact location of the animal for accurate directions. We can't rescue an animal if we can't find it.
7 Call Park headquarters with as much information as you have.

IT IS ILLEGAL FOR UNAUTHORIZED PERSONS TO TOUCH, HARASS OR PROMPT THE ANIMAL IN ANY WAY TO CHANGE ITS NATURAL BEHAVIOR. IT'S ALSO STRESSFUL TO THE WILD ANIMAL!